OPINION

by prof. Daniela Borissova, D.Sc.
from Institute of Information and Communication Technologies at BAS,
member of the scientific jury appointed by Order of the Director of IICT-BAS
No. 168/05.07.2023

About: Dissertation work of Valentina Todorova Terzieva-Bogoycheva entitle "Technological approaches for personalized learning using educational computer games", submitted for the acquisition of the educational and scientific degree "Doctor", doctoral program "Informatics", professional field 4.6 "Informatics and computer sciences", scientific field 4. Natural sciences, mathematics and informatics.

At the first meeting of the scientific jury, held on 07.07.2023, I was assigned to prepare an opinion on the procedure, for which I received all the necessary documents.

ACTUALITY

New technologies and especially ICT have a significant impact on the educational process. This affects the way knowledge and skills are acquired at all levels of education, through the use of different approaches such as technology-assisted or technology-based learning, incl. gamification. Game-based learning is the intersection of two rapidly developing fields, namely e-learning and distance learning. Thanks to this innovative technology that uses video games, games with virtual, augmented or mixed reality, the learner perceives the process as a pleasant and motivating activity. Taking into account the massive use of IT in the educational process determines the relevance and necessity of conducting research related to the development of different approaches to personalized learning using educational computer games.

KNOWLEDGE OF THE PROBLEM

From the overview made, as well as from the published results on the topic of the dissertation work, it can be established that the doctoral student is well aware of the nature of the researched issues. Additional proof of this is the number of cited sources in the bibliography.

ANALYTICAL CHARACTERISTIC

The dissertation has a total volume of 172 pages, incl. 40 figures, 11 tables and 213 references and 5 appendices. It is structured as follows: introduction, 5 chapters, conclusion, possibilities for future development, list of the author's publications on the dissertation work, approbation of the results, open citations of the articles related to the dissertation, main results

in the dissertation work, declaration of originality of the results, acknowledgments and bibliography. The purpose and tasks of the dissertation research are formulated on pages 3-4.

In **Chapter 1**, an analysis of modern technology-based approaches and used learning technologies is made. The main concepts, types and characteristics of educational computer games are presented, as well as their use in the context of learning. The approaches to personalized learning are analyzed and conclusions are drawn for their application in learning through educational games.

Chapter 2 analyzes the ICT tools and educational games used in Bulgarian schools. The need to create electronic learning resources of the type of educational video games for the purposes of the learning process has been determined. Studies of teachers' preferences regarding the application of educational games and their customization are presented and analyzed. Learners' opinions about different types of educational games have been examined and evaluated.

In **Chapter 3**, the main models for the design of educational video games are presented: 1) a combined learner model, covering profiles such as user, learner and player, which helps to personalize educational video games; 2) a metamodel of the learning content in an educational video game from perspective of its use in a personalized educational video game; 3) a conceptual model for the personalization of video learning games and a methodology of the personalization process is described.

Chapter 4 describes a conceptual model of an enriched maze-type educational video game using the APOGEE platform. The developed methodology for personalizing an educational video game of the same type by using embedded mini-games is presented. The developed universal and customized by difficulty level educational video games of the enriched maze type "Asenevtsi" were analyzed.

Chapter 5 describes a methodology for validating and evaluating (through qualitative and quantitative characteristics) customized enriched maze educational video games.

ABSTRACT AND AUTHOR'S REFERENCE

The submitted abstracts, in Bulgarian and English, faithfully reflect the content of the dissertation work and correspond to the requirements of Law on the Development of the Academic Staff in the Republic of Bulgaria and the Rules for its Implementation. From the submitted declaration of originality, as well as from the publications on the subject of the dissertation, it can be determined that the described results are the personal work of the author.

ASSESSMENT OF COMPLIANCE WITH THE MINIMUM NATIONAL REQUIREMENTS AND WITH THE ADDITIONAL REQUIREMENTS

A total of 8 publications on the topic of the dissertation are presented, 1 of them is in an edition with SJR, 3 are in editions that are referenced and indexed in world-famous databases with scientific information (Web of Science). Thus, the presented publications on the subject of the dissertation fully satisfy both the minimum national requirements and the

specific requirements of IICT-BAS for the acquisition of the educational and scientific degree "Doctor". The total number of points from the publications on the topic amounts to 56 points, with 30 points required.

CONTRIBUTIONS

I accept the contributions formulated by the doctoral student, evaluating them as scientific and applied contributions.

CRITICAL COMMENTS AND RECOMMENDATIONS

The dissertation is well structured and balanced. I personally know Valentina Terzieva-Bogoycheva not only as a motivated and active scientist in the field of informatics and computer sciences, but also as a very positive, purposeful and hardworking colleague.

CONCLUSION

The results obtained on the subject of the dissertation research convincingly show that Valentina Terzieva-Bogoycheva possesses the necessary theoretical knowledge and practical skills in the field of informatics and computer science, as well as proven abilities for independent scientific research. The presented dissertation meets the requirements of the Law on the Development of the Academic Staff in the Republic of Bulgaria, the Rules for its Implementation, as well as the Rules for the Specific Conditions for Acquiring Scientific Degrees and Holding Academic Positions at IICT-BAS. The obtained results on the subject of the dissertation research give me sufficient reason to give a categorically positive assessment of the dissertation work thus presented and **I propose to the respected Scientific Jury to award Valentina Todorova Terzieva-Bogoycheva the educational and scientific degree "Doctor" in the doctoral program "Informatics", professional field "Informatics and Computer Sciences".**

16.08.2023 г.

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